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January 1963 ARS-33-82

United States Department of Agriculture
Agricultural Research Service

# A COMMUNITY EFFORT IN BOLL WEEVIL CONTROL [1]

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Several studies have indicated that control of overwintered boll weevils (Anthonomus grandis, Boheman) delayed population increases and reduced the number of late-season applications of insecticide required (Bondy, 1939; Fye, et al., 1961; Ewing and Parencia, 1949 a and b, 1950). [2]

It appeared that an early-season insecticide program for control of the boll weevil on a community-wide basis in the Coastal Plain area of South Carolina should be feasible for the following reasons: (1) Adult populations are lowest early in the season; (2) plants are small at this time and more thorough coverage is possible; (3) overwintered weevils are more susceptible to the chlorinated hydrocarbons than later generations (Brazzel, 1959) and preliminary data have indicated that the insects may react similarly to organic phosphorus compounds (unpublished data); (4) U.S. Weather Bureau records over the past 40 years show that rainfall is greater in July than in June in this area (U.S. Department of Agriculture, 1941); and (5) theoretically, oviposition would be greatly reduced by early-season control and if followed by a series of insecticide applications during late July and August, weevils would not increase sufficiently to cause mass flights from treated fields; thus, 100 percent participation in an early-season program by growers in a given area should reduce the number of insecticide applications required later.

Arrangements were made with a group of 12 cotton farmers in the Wallace, S. C., area to evaluate early-season boll weevil control in a cooperative, grower-applied, area-wide program, involving 1,895 acres of cotton. The purpose of this experiment was to determine: (1) The degree of control achieved by growers directing efforts against overwintered weevils, (2) the overall efficacy of a large-scale community program, and (3) the time required by the weevil population surviving the early-season applications to increase to economically damaging proportions.

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[1] In cooperation with the South Carolina Agricultural Experiment Station, Florence, S. C.

[2] See References Cited at end of report.

The experimental area, located in Marlboro County, was about 5 miles wide and extended in a north-south direction along the Great Pee Dee River for about 15 miles. The area was fairly well isolated from other cotton acreages, the nearest plantings being $\frac{1}{2}$ mile to the north, 1 mile to the east, and 3 miles to the south and west.

Procedure.- A treatment schedule was chosen to insure that weevils entering the field from hibernation quarters throughout the entire emergence period would be subjected to a lethal dose of insecticide before oviposition became possible.

If oviposition is to be prevented during weevil emergence, lethal amounts of an effective insecticide must be continuously present on the plants after they begin to fruit. The residual effectiveness of the insecticides, therefore, must be taken into account when planning the application schedule. The relationship between the preoviposition period, application schedule, and duration of effective residual activity may be expressed as follows:

$I$ cannot exceed $R + P$ where:

$I$ = interval between insecticide applications,

$R$ = length of effective residual activity, and

$P$ = preoviposition period.

Thus, assuming a 3-day preoviposition period, an insecticide with less than a 4-day effective residual, applied at 7-day intervals, would be ineffective in preventing oviposition by continuously emerging females.

It was agreed upon at meetings with the cooperating growers that the early-season applications would be made at 5-day intervals beginning when the oldest cotton in the area (field 2) had developed to the 8-leaf stage. However, it was deemed necessary to initiate the insecticide treatments about 7 days before the plants produced squares because of the evidence in boll weevil-rearing studies that adults can produce viable eggs while feeding on cotton seedlings only (Vanderzant and Davich, 1958). Thus, about 50 percent of the total acreage was treated before the cotton reached the 8-leaf stage. Because of necessary replanting owing to cool, wet weather, a difference of 3 weeks occurred between the planting of the youngest and oldest cotton in the treatment area.

Because of the excellent immediate and residual effectiveness of Guthion (O,O-dimethyl S-(4-oxo-1,2,3-benzotriazin-3-(4H)-ylmethyl) phosphorodithioate), all cooperating growers were asked to use this compound. DDT was included in the later applications to insure control of bollworms (*Heliothis* spp.). However, one grower chose to use Sevin (1-naphthyl N-methylcarbamate) and BHC-DDT.

Of the 1,895 acres in the treatment area, 1,796 (fields 1 through 12) were treated with a Guthion emulsion spray at 0.25 pound per acre or Guthion at 0.25 plus DDT at 0.5 pound per acre. All of these fields received five early-season treatments except fields 6 through 9, which received only four. Each field received two treatments that included DDT. The 12 fields also received from one to five late-season applications.

The 99 acres (field 13) not treated with Guthion were treated with Sevin and BHC-DDT dusts on a continuous application schedule. The Sevin was applied at 0.75 or 1.13 pounds per acre and the BHC-DDT at 0.45 plus 1.5 or 0.5 plus 2.0 pounds per acre. In this field, five treatments were applied during the early season, and ten from July 10 to August 22.

The three control fields, totaling 32 acres, did not receive early-season treatments. The first (field 14) received three late applications of toxaphene dust at 2.0 pounds per acre on July 8, 16, and August 3. The other two (fields 15 and 16) were treated with Guthion-DDT at 0.25 plus 0.5 pound per acre; field 15 received a single late application on July 26, and field 16, four applications on July 17, 24, 31, and August 8.

The spray applications were made at rates ranging from 3.25 to 5.33 gallons per acre. Tractor-mounted and high-clearance, self-propelled sprayers, equipped with three nozzles per row or broadcast spray booms, were used to apply the insecticides. The dust was applied at various rates with tractor-mounted dusters; and in control field 14, dust was applied by the "hand-sack" method.

Boll weevil and bollworm infestation records within the treated area were obtained from 16 field sampling areas varying in size from 1.3 to 8 acres. The total area sampled was 87.3 acres.

To determine adult weevil populations prior to squaring, 50 consecutive plants at 10 randomly selected points per acre in each sampling area were examined After square production started, the number of adults present was determined at the same time that the larval infestation examinations were made.

To determine the magnitude of weevil and bollworm infestations from June 14 to July 6, all squares of puncturable size (5 mm. or larger in diameter) on 10 plants at 10 randomly selected points per acre were examined in each of the 16 individual sampling areas. Thereafter, because of the rapidly increasing numbers of squares, all squares on 5 plants at 10 randomly selected points per acre in each sampling area were examined. Infestation percentages were based on the total number of squares punctured. Since many squares were punctured more than once, these percentages do not reflect the total number of oviposition and feeding punctures. The number of plants per acre in each field from which records were taken was used to calculate weevils and punctures per acre. Significant bollworm populations did not develop in any of the fields under examination, and these records are not included in the data.

Infestations in control fields 14, 15, and 16 were not recorded until late in July.

The yields of lint cotton per acre from the total acreage under treatment, with the exception of fields 2 and 4, were determined from local gin records. Accurate records from fields 2 and 4 were not available.

Records were also kept of the rainfall in each of the 16 field sampling areas during the treatment period, as well as the amounts of fertilizer per acre applied by the cooperating growers.

Two spring (1961, 1962) and one fall (1961) woods trash examinations were made to compare numbers of weevils in hibernation within the treatment area with those in the surrounding areas.

Results.- The data from all fields are summarized in tables 1, 2, and 3. Detailed records from several fields representative of those receiving four different treatment schedules are presented as follows: (1) Highest and lowest yielding fields (3 and 5) which received five early-season, plus four or five late-season applications, table 4; (2) highest and lowest yielding fields (11 and 12) which received five early-season, plus one late-season application, table 5; (3) field 13, which received fifteen continuous dust applications from June 14 to August 22, table 6; and (4) field 15, which received one insecticide application on July 26, table 7.

Pretreatment overwintered boll weevil populations ranged from 0 to 169 per acre. After treatment began, weevil movement from hibernation sites into the treated area could not be accurately determined by field examinations because of the effectiveness of the control program. However, some indication of the numbers of weevils entering the fields can be obtained from records of field 13 (table 6) where four applications of Sevin dust and two applications of BHC plus DDT dust were made between June 14 and July 10. Weevil populations ranged from 44 to 133 per acre with an average of 81 for the emergence period.

After early-season treatments were completed, periods ranging from 23 to 46 days, with an average of 36 days, elapsed before a ten-percent boll weevil infestation of squares occurred in the various fields. However, most growers had made one or more late-season applications before this time. The intervals during which insecticides were not applied ranged from 24 to 52 days, with an average of 36. It is generally believed that cotton grown in this area should receive treatment in the early fruiting period before infestation reaches the 10-percent level if maximum yields are to be realized (Bondy, 1939). It appears, however, that for determining the starting time for the series of late-season applications following early-season treatments, a lower infestation figure from 3 to 5 percent should be used.

Some growers, because of inadequate use of fertilizer, could not justify late-season, boll-weevil-control treatments. Others applied a series of late-season treatments of Guthion plus DDT which were only partially effective because of low application rates and extended application intervals. These intervals ranged from 4 to 14 days with an average of 7.4 days. Thus, in fields 6 through 12, where one or two late-season applications were made at 10- to 14-day intervals, and in control fields 14, 15, and 16, where one to four late-season applications were made at 7 to 18-day intervals, there was little effect on the rapidly developing boll weevil populations.

No attempt has been made to compare the effectiveness of the insecticides used because of the wide variation in application methods and equipment.

Data on oviposition and feeding damage (table 1) show that complete kill of overwintered weevils entering the fields was not obtained. However, infestations were greatly reduced in all fields receiving 4 or 5 applications of Guthion, or Guthion plus DDT. At the end of the emergence period the infestation was less than 0.8 percent punctured squares in all such fields except in field 9 in which it was 1.24 percent, indicating that adult populations were reduced to low levels during the treatment period.

Complete kill was not obtained, at least in part, because of excessive rainfall throughout the treatment period, which made it impossible for growers to maintain the 5-day-interval application schedule. The intervals ranged from 2 to 11 days. In many instances, substantial amounts of rain fell shortly after the insecticides were applied, which materially decreased their effectiveness.

In fields that received early-season treatment, maximum oviposition occurred on August 21 or 22, with the exception of fields 9 and 10, where it occurred on August 15 or 16. In the three fields that did not receive early-season treatment, maximum oviposition occurred on or before July 31, approximately 3 weeks earlier than in the treated fields. Higher weevil infestations developed sooner in fields 9 and 10 than in the other early-treated fields This was due in part to an 11-day interval between early-season applications 3 and 4 in field 9 and the delay in beginning the late-season treatments until August 16 in field 10.

Field 13 consistently had a higher weevil infestation, which necessitated continued treatment. In spite of this, the infestation reached the 10-percent punctured square level before August 2. The 10-percent infestation level occurred in control fields 15 and 16 before July 31, and in field 14 before July 10. The infestation in all other fields except 1, 9, 10, and 12 reached this level on August 15 or 16. The infestation did not reach the 10-percent level in field 1 until August 21; in fields 9 and 12, on July 31; and in field 10, on August 7.

In fields receiving the most effective schedule of applications (tables 4 to 6), the number of weevils present, based on the numbers of egg and feeding punctures, and percent of infestation, remained at low levels during the periods of the overwintered and $F_1$ generations. However, the numbers increased rapidly during the peak emergence and oviposition of the $F_2$ generation during the third week of August. Egg punctures increased from 100 or less per acre at the end of June to 10,000 or more per acre during the third week of August (tables 4 to 7). In field 13, where the infestation was consistently higher, egg punctures increased from 399 per acre at the end of June to 38,990 during the third week of August (table 6). In field 15, which received only one insecticide application on July 26, peak oviposition occurred on or before the end of July (table 7).

The data show that the rate at which the weevil infestation increases through one generation depends upon the magnitude of the parental population in relation to the total food available at any given time. If the parental population is relatively small, either naturally or because of effective control measures, the rate of population increase will be high in the absence of imposed artificial restrictions, while the rate of increase per generation from a large parental population may be low. To illustrate, the infestation in field 15 (table 7) is compared with that of field 3 (table 4). The infestation in field 15, which had a relatively large population on July 31 (26.8 percent punctured squares) was 91.5 percent or 3.4 times the previous figure on August 28. In field 3, which had a smaller population (5.5 percent punctured squares) on August 2, the infestation on August 28 was 51.1 percent or 9.2 times the previous figure, in the absence of control measures during the same period.

When comparisons are made of the infestation figures in tables 4 to 7, the numbers of squares and plants per acre must be considered in estimating the existing or potential future population. For example, a 0.6-percent infestation on July 24 in field 3 (table 4) with 166,910 squares per acre, represents 985 punctured squares per acre, whereas a comparable percentage of infestation, 0.6 percent on July 31 in field 5 (table 4) with 76,267 squares per acre, represents 419, or less than one-half as many punctured squares per acre. This indicates a considerably smaller adult population present at that time in field 5, as well as a smaller potential population in the succeeding generation. Hence, a relatively low percent of infestation in an unprotected field containing large numbers of squares can rapidly increase to damaging proportions (table 5). However, even four or five late-season insecticide treatments at only partially effective dosages and intervals can delay population development (table 4).

Woods trash examinations, consisting of 45 two-square-yard samples taken from hibernation sites in the Wallace treatment area in Marlboro County in the spring of 1961, showed an average of 1,291 weevils per acre in hibernation. Similar woods trash examinations, consisting of 90 two-square-yard samples, were made in Florence, Darlington, and Marlboro counties, South Carolina, and Scotland County, North Carolina. An average of 1,129 weevils per acre in the four-county area indicated that the populations in the two areas were comparable. Woods trash examinations were made in the same areas in the fall of 1961. These indicated an average of 5,380 weevils per acre in hibernation in the treatment area compared with an average of 13,632 in the four-county area. This is a 60.5-percent reduction in the number of hibernating weevils in the area receiving the community-control treatments, as compared with the nearby four-county area.

Woods trash examinations in the spring of 1962 in the same areas indicated an average of 1,184 weevils per acre in hibernation in the treatment area and 3,654 in the four-county area. The 67.6 percent reduction of weevils found in the treatment area is comparable with that found in the fall of 1961.

## Discussion

The data showed that the early-season, community-wide, boll-weevil-control program held weevil populations to very low levels during the application period, and below the 10-percent, punctured-square level for 3 to 5 weeks thereafter. The data indicate that the mass migration usually resulting from the emergence of the $F_2$ generation will not occur in populations produced in fields that have received effective early-season applications of insecticide and 4 or more late-season applications, beginning when the infestation reaches approximately 3 to 5 percent.

Yield data indicate early- plus late-season applications will produce the greatest economic returns only if other necessary production practices, such as the use of adequate fertilizer and defoliants, are followed.

A reduction of over 60 percent in the number of overwintering weevils in hibernation quarters within the treatment area below that of the surrounding area indicates that an early-season program, followed by a series of effective late-season applications will materially reduce the numbers of weevils entering hibernation and surviving within the treatment area.

The early-season weevil infestation data show that although numbers of weevils can be materially reduced, complete control with available materials and equipment is extremely difficult. This is largely because of the impossibility of achieving complete plant coverage and the deleterious effects of rainfall on insecticides and application schedules. The data does indicate, however, that the number of weevils can be reduced to levels at which other approaches to control, such as the sterile male release technique or plant resistance, could be used effectively to further reduce or to decimate the population.

The demonstrated success of the early-season community-control program should encourage other groups growing cotton under similar environmental conditions to consider this approach to boll weevil control. Wide usage of an effective early-season control program should decrease population buildup to the extent that need for late-season control would be reduced to a minimum, and the problem of controlling mass migrating weevils within the treatment area would be largely eliminated.

Table 1. Summary of boll weevil records made in cotton fields before and during early-season insecticide treatments applied from June 7-July 3, 1961

| Field No. | Spray applications | | Total rain during treatment | Pretreatment count (Weevils per acre) | Per acre averages during treatment | | | |
|---|---|---|---|---|---|---|---|---|
| | Guthion[a] | Guthion-DDT[b] | | | Weevils | Egg punctures | Feeding punctures | Larval infestation |
| | Number | Number | Inches | Number | Number | Number | Number | Percent |
| 1 | 3 | 2 | 7.2 | 10 | 0 | 24 | 84 | 0.4 |
| 2 | 3 | 2 | 7.4 | 166 | 8 | 28 | 180 | .4 |
| 3 | 3 | 2 | 7.5 | 0 | 16 | 71 | 61 | .2 |
| 4 | 3 | 2 | 6.4 | 37 | 0 | 69 | 166 | .4 |
| 5 | 3 | 2 | 8.1 | 42 | 0 | 53 | 53 | .3 |
| 6 | 2 | 2 | 7.1 | 76 | 33 | 51 | 265 | .5 |
| 7 | 2 | 2 | 5.5 | 0 | 0 | 294 | 74 | .4 |
| 8 | 2 | 2 | 5.5 | 169 | 6 | 19 | 51 | .2 |
| 9 | 2 | 2 | 6.6 | 70 | 7 | 32 | 664 | 1.2 |
| 10 | 3 | 2 | 6.5 | 98 | 8 | 8 | 156 | .4 |
| 11 | 3 | 2 | 4.8 | 29 | 17 | 57 | 200 | .5 |
| 12 | 3 | 2 | 6.8 | 125 [c] | 0 | 205 | 337 | .7 |
| 13 | 5(dust)[d] | | 6.4 | 72 | 81 | 1492 | 1970 | 4.8 |
| Controls: | | | | | | | | |
| 14 | No early season records | | | | | | | |
| 15 | | do | | | | | | |
| 16 | | do | | | | | | |

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[a] Guthion at 0.25 lb./acre.

[b] Guthion-DDT at 0.25-0.5 lb./acre.

[c] Average of two determinations.

[d] Three Sevin applications at 0.75 lb./acre, 1 at 1.13 lb./acre, and 1 BHC + DDT application at 0.45 + 1.5 lb./acre.

Table 2. Summary of boll weevil records made in cotton fields during the period from July 4 to July 25, 1961 when no insecticide applications were made

| Field No. | Per acre averages | | | Larval Infestation (Percent) | Days to reach 10% infestation after early-season applications | Days to resumption of applications |
|---|---|---|---|---|---|---|
| | Weevils | Egg punctures | Feeding punctures | | | |
| 1 | 0 | 107 | 21 | 0.1 | 46 | 26 |
| 2 | 23 | 930 | 302 | .8 | 33 | 29 |
| 3 | 36 | 412 | 81 | .3 | 38 | 30 |
| 4 | 20 | 567 | 527 | .6 | 37 | 24 |
| 5 | 0 | 341 | 149 | .5 | 41 | 41 |
| 6 | 82 | 1,554 | 675 | 1.7 | 38 | 32 |
| 7 | 49 | 1,173 | 342 | 1.1 | 35 | 28 |
| 8 | 30 | 1,328 | 294 | 1.6 | 38 | 35 |
| 9 | 67 | 5,022 | 1,115 | 4.3 | 24 | 35 |
| 10 | 196 | 5,809 | 5,197 | 11.5 | 37 | 46 |
| 11 | 0 | 524 | 131 | .4 | 37 | 26 |
| 12 | 771 | 8,544 | 13,470 | 27.5 | 23 | 52 |
| 13 | - | - | - | - | - | - |
| Controls: | | | | | | |
| 14 | No data taken | | | | | |
| 15 | Do | | | | | |
| 16 | Do | | | | | |

Table 3. Summary of boll weevil records made in cotton fields following beginning of late-season insecticide applications and amount of nitrogen fertilizer applied. 1961

| Field No. | Number of insecticide applications | | Averages after July 25 | | | | Yield: Pounds of lint cotton per acre | Pounds of nitrogen applied per acre |
|---|---|---|---|---|---|---|---|---|
| | | | Numbers per acre | | | Percent punctured squares | | |
| | Late season a/ | Total | Weevils | Egg punctures | Feeding punctures | | | |
| 1 | 5 | 10 | 155 | 3,731 | 2,094 | 11.8 | 668 | 66 |
| 2 | 5 | 10 | 684 | 19,284 | 18,586 | 36.0 | - | 73.5 |
| 3 | 5 | 10 | 182 | 6,692 | 6,423 | 20.0 | 694 | 74 |
| 4 | 5 | 10 | 446 | 6,994 | 6,675 | 22.8 | - | 58 |
| 5 | 4 | 9 | 144 | 6,112 | 5,957 | 24.0 | 660 | 58 |
| 6 | 2 | 6 | 294 | 6,329 | 7,065 | 26.0 | 524 | 56 |
| 7 | 2 | 6 | 616 | 14,083 | 11,912 | 28.7 | 501 | 60 |
| 8 | 2 | 6 | 514 | 8,399 | 6,723 | 24.6 | 440 | 62 |
| 9 | 2 | 6 | 754 | 16,061 | 16,493 | 59.3 | 440 | 62 |
| 10 | 1 | 6 | 565 | 14,074 | 11,886 | 39.8 | 470 | 47 |
| 11 | 1 | 6 | 612 | 5,400 | 10,695 | 46.9 | 607 | 72.5 |
| 12 | 1 | 6 | 1454 | 13,744 | 24,932 | 56.3 | 448 | 47 |
| 13 | 6 b/ | 15 c/ | 1822 | 17,441 | 20,817 | 57.8 | 558 | 62 |
| 14 | | 3 d/ | 2059 | 8,884 | 11,890 | 69.4 | 180 | 31 |
| 15 | | 1 a/ | 1608 | 6,944 | 18,430 | 66.1 | 223 | 48 |
| 16 | | 4 a/ | 2083 | 13,814 | 20,478 | 46.1 | 375 | 39 |

a/ Guthion-DDT at 0.25-0.5 lb./acre.

b/ Three applications of Sevin dust at 1.13 lbs/acre and 3 applications of BHC-DDT dust at 0.6-2.0 lbs./acre.

c/ Continuous dust applications include 3 applications of Sevin at .75 lb./acre, 5 applications of Sevin at 1.13 lbs./acre, 1 application of BHC-DDT at 0.45-1.5 lbs./acre and 6 applications of BHC-DDT at 0.6-2.0 lbs./acre.

d/ Toxaphene dust applications at 2.0 lbs./acre.

Table 4.- Rainfall, boll weevil infestation records, and numbers of squares in high (No. 3) and low (No. 5) yielding fields receiving 5 early, and 4 or 5 late-season treatments

| Rainfall | | Date | | Numbers per Acre | | | | Larval Infestation (Percent) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Punctures | | |
| Date | Amount (inches) | Treated[a] | Examined | Squares[b] | Weevils | Egg | Feeding | |
| | | | | FIELD 3 [c] | | | | |
| | | 6/7 | 6/5 | 0 | 0 | | | |
| 6/11 | 0.5 | | | | | | | |
| 6/12-13 | 3.0 | | | | | | | |
| 6/15 | 1.1 | 6/15 | 6/14 | 0 | 0 | | | |
| 6/20-21 | 1.5 | 6/20 | 6/19 | 14,158 | 0 | 0 | 0 | 0 |
| 6/25-27 | 1.4 | 6/26 | 6/23 | 33,065 | 0 | 0 | 81 | .2 |
| | | 7/1 | 6/29 | 97,860 | 81 | 81 | 81 | .3 |
| 7/6-7 | .8 | | 7/6 | 101,105 | 0 | 203 | 81 | .3 |
| 7/8 | 2.5 | | | | | | | |
| | | | 7/11 | 151,360 | 0 | 0 | 0 | 0 |
| | | | 7/18 | 179,977 | 0 | 243 | 243 | .3 |
| | | | 7/24 | 166,910 | 108 | 990 | 0 | .6 |
| 7/26 | 1.5 | | | | | | | |
| | | 7/31 | 8/2 | 136,890 | 0 | 7,303 | 568 | 5.5 |
| 8/3 | .2 | | | | | | | |
| 8/5-6 | 1.25 | | | | | | | |
| | | 8/7 | 8/8 | 130,262 | 108 | 2,705 | 1,947 | 2.5 |
| 8/9-10 | 1.5 | | | | | | | |
| | | 8/14 | 8/16 | 90,125 | 108 | 6,708 | 18,176 | 17.4 |
| 8/18 | .1 | 8/18 | 8/22 | 48,057 | 209 | 10,575 | 4,607 | 22.7 |
| | | 8/22 | 8/28 | 15,255 | 487 | 6,167 | 6,816 | 51.1 |
| | | | | FIELD 5 [d] | | | | |
| | | 6/7 | 6/5 | 0 | 42 | | | |
| 6/11-13 | .5 | 6/12 | 6/14 | 0 | 0 | 0 | 0 | |
| 6/15 | 1.8 | | | | | | | |
| | | 6/17 | 6/19 | 11,097 | 0 | 0 | 0 | 0 |
| 6/20-21 | 1.9 | | | | | | | |
| | | 6/22 | 6/23 | 20,503 | 0 | 127 | 127 | 1.0 |
| 6/26-28 | 3.5 | | | | | | | |
| | | 6/29 | 6/28 | 34,624 | 0 | 0 | 0 | 0 |
| 7/3 | .4 | | | | | | | |
| 7/6-7 | .6 | | 7/6 | 80,874 | 0 | 84 | 84 | .2 |
| 7/8 | 2.5 | | | | | | | |
| | | | 7/11 | 107,888 | 0 | 169 | 0 | .2 |
| 7/15 | .5 | | | | | | | |
| | | | 7/18 | 129,028 | 0 | 254 | 169 | .3 |
| 7/23 | .4 | | 7/24 | 96,905 | 0 | 602 | 344 | .9 |
| 7/26 | 1.4 | | | | | | | |
| 7/30 | 1.8 | | 7/31 | 76,267 | 0 | 338 | 84 | .6 |
| 8/1 | .4 | | | | | | | |
| 8/3 | .2 | | | | | | | |
| 8/5-6 | 1.8 | | | | | | | |
| 8/9-10 | 2.0 | 8/9 | 8/9 | 42,614 | 0 | 338 | 2,367 | 3.2 |
| | | 8/14 | 8/16 | 47,010 | 169 | 9,808 | 12,514 | 34.4 |
| | | 8/21 | 8/22 | 46,003 | 172 | 14,875 | 6,449 | 33.5 |
| 8/26-27 | 1.8 | | | | | | | |
| | | 8/28 | 8/28 | 17,249 | 380 | 5,200 | 8,371 | 48.5 |

[a] Spray applications at 0.25 lb./acre of Guthion on June 7, 12, and 17. Later application at 0.25 lb. of Guthion plus 0.5 lb. of DDT per acre.

[b] One week old or older.

[c] Plants per acre, 32,458; lint cotton per acre, 694 pounds. Five late treatments.

[d] Plants per acre, 25,366; lint cotton per acre, 660 pounds. Four late treatments.

Table 5.- Rainfall, boll weevil infestation records, and numbers of squares in high (No. 11) and low (No. 12) yielding fields receiving five early, and one late-season treatment

| Rainfall | | Date | | Numbers per Acre | | | | Larval Infestation (Percent) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Punctures | | |
| Date | Amount (inches) | Treated[a] | Examined | Squares | Weevils | Egg | Feeding | |
| | | | | FIELD 11 [b] | | | | |
| | | | 6/5 | | 29 | | | |
| | | 6/9 | | | | | | |
| 6/11-13 | 0.5 | | | | | | | |
| 6/14 | .7 | 6/14 | 6/14 | 5,980 | 0 | 39 | 0 | 0.7 |
| 6/15 | 2.2 | | | | | | | |
| | | 6/19 | 6/19 | 24,619 | 0 | 39 | 194 | .6 |
| 6/20-21 | .6 | | | | | | | |
| | | | 6/23 | 50,212 | 39 | 78 | 194 | .4 |
| | | 6/24 | | | | | | |
| 6/25-26 | .3 | | | | | | | |
| 6/27-28 | .2 | | 6/28 | 70,074 | 44 | 44 | 568 | .8 |
| | | 7/1 | | | | | | |
| 7/3 | .3 | | | | | | | |
| | | | 7/5 | 108,212 | 0 | 87 | 44 | .1 |
| 7/6-7 | .6 | | | | | | | |
| 7/8 | .4 | | | | | | | |
| | | | 7/10 | 154,303 | 0 | 87 | 0 | .1 |
| 7/15 | .1 | | | | | | | |
| | | | 7/17 | 177,720 | 0 | 524 | 393 | .4 |
| 7/18 | .8 | | | | | | | |
| 7/23 | .3 | | | | | | | |
| | | | 7/24 | 145,828 | 0 | 961 | 0 | .7 |
| 7/26 | 1.2 | | | | | | | |
| | | 7/27 | | | | | | |
| 7/30 | .6 | | | | | | | |
| | | | 7/31 | 68,152 | 0 | 961 | 175 | 1.5 |
| 8/1 | .1 | | | | | | | |
| 8/3 | .4 | | | | | | | |
| 8/5-6 | .4 | | | | | | | |
| 8/9-10 | 1.7 | | 8/7 | 28,834 | 262 | 262 | 524 | 2.4 |
| | | | 8/15 | 19,048 | 1,223 | 6,204 | 12,582 | 56.0 |
| 8/18 | .9 | | | | | | | |
| | | | 8/22 | 15,028 | 874 | 11,184 | 21,494 | 80.2 |
| 8/26-27 | 3.8 | | 8/28 | 9,611 | 699 | 8,388 | 18,698 | 94.6 |
| | | | | FIELD 12 [c] | | | | |
| | | | 6/5 | | 196 | | | |
| 6/11-13 | 0.5 | | | | | | | |
| 6/14 | .5 | 6/14 | 6/14 | | 54 | | | |
| 6/15 | 2.6 | | | | | | | |
| | | 6/17 | | | | | | |
| | | 6/19 | 6/19 | 14,129 | 0 | 0 | 0 | 0 |
| 6/20-21 | 1.0 | 6/21 | | | | | | |
| | | | 6/23 | 34,769 | 0 | 0 | 410 | 1.0 |
| 6/25-26 | .3 | | | | | | | |
| 6/27-28 | 1.6 | | 6/28 | 63,093 | 0 | 117 | 352 | .6 |
| | | 7/1 | | | | | | |
| 7/3 | .3 | | | | | | | |
| | | | 7/5 | 86,666 | 0 | 703 | 586 | 1.4 |
| 7/8 | .4 | | 7/10 | 158,672 | 0 | 469 | 117 | .3 |
| 7/15 | .6 | | | | | | | |
| | | | 7/17 | 161,369 | 0 | 0 | 0 | 0 |
| 7/23 | .3 | | | | | | | |
| | | | 7/24 | 140,025 | 0 | 3,049 | 3,049 | 3.3 |
| 7/26 | 1.1 | | | | | | | |
| 7/30 | .6 | | | | | | | |
| | | | 7/31 | 76,228 | 117 | 13,369 | 1,290 | 18.3 |
| 8/5-6 | 2.4 | | | | | | | |
| | | | 8/7 | 40,460 | 0 | 3,870 | 1,876 | 11.3 |

Table 5.- (Continued)

| Rainfall |  | Date |  | Numbers per Acre |  |  |  | Larval Infestation (Percent) |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | Punctures |  |  |
| Date | Amount (inches) | Treated a/ | Examined | Squares b/ | Weevils | Egg | Feeding |  |
| 8/9-10 | 2.1 |  |  |  |  |  |  |  |
|  |  |  | 8/15 | 29,084 | 3,401 | 7,623 | 46,675 | 65.3 |
| 8/18 | .9 |  |  |  |  |  |  |  |
|  |  |  | 8/21 | 24,628 | 1,876 | 31,429 | 41,280 | 94.3 |
|  |  | 8/22 |  |  |  |  |  |  |
| 8/26-27 | 3.5 |  |  |  |  |  |  |  |
|  |  |  | 8/28 | 14,777 | 1,876 | 12,431 | 33,540 | 82.1 |

a/ Spray applications at 0.25 lb./acre of Guthion on June 14, 17 and 19. Later applications at 0.25 lb. of Guthion plus 0.5 lb. of DDT per acre.

b/ Plants per acre, 34,950; lint cotton per acre, 607 pounds.

c/ Plants per acre, 46,910; lint cotton per acre, 448 pounds.

Table 6.- Rainfall, boll weevil infestation records, and numbers of squares in Field 13 receiving 15 continuous treatments

| Rainfall |  | Date |  | Numbers per Acre |  |  |  | Larval Infestation (Percent) |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | Punctures |  |  |
| Date | Amount (inches) | Treated a/ | Examined | Squares | Weevils | Egg | Feeding |  |
|  |  |  |  | FIELD 13 b/ |  |  |  |  |
|  |  |  | 6/5 |  | 72 |  |  |  |
| 6/11-13 | 0.5 |  |  |  |  |  |  |  |
| 6/14-15 | 2.3 | 6/14 | 6/14 |  | 54 |  |  |  |
|  |  | 6/19 | 6/19 | 10,327 | 131 | 0 | 436 | 3.4 |
| 6/20-21 | 1.9 |  |  |  |  |  |  |  |
|  |  | 6/22 | 6/23 | 28,177 | 44 | 532 | 1,639 | 5.8 |
| 6/27-28 | 1.7 |  |  |  |  |  |  |  |
|  |  | 6/29 | 6/29 | 57,063 | 133 | 399 | 3,456 | 4.6 |
|  |  | 7/5 |  |  |  |  |  |  |
| 7/6-7 | 1.9 |  | 7/6 | 87,852 | 44 | 3,544 | 2,348 | 5.5 |
| 7/8 | 2.5 |  |  |  |  |  |  |  |
|  |  | 7/10 |  |  |  |  |  |  |
|  |  |  | 7/11 | 137,249 | 0 | 3,278 | 0 | 2.3 |
|  |  | 7/14 |  |  |  |  |  |  |
| 7/15 | .8 |  |  |  |  |  |  |  |
|  |  |  | 7/18 | 159,934 | 177 | 975 | 1,861 | 1.0 |
|  |  | 7/20 |  |  |  |  |  |  |
|  |  |  | 7/24 | 135,000 | 443 | 6,362 | 2,702 | 5.4 |
| 7/26 | .9 |  |  |  |  |  |  |  |
|  |  | 7/25 |  |  |  |  |  |  |
| 7/27 | 3.4 |  |  |  |  |  |  |  |
|  |  | 7/28 |  |  |  |  |  |  |
| 7/30 | 2.8 |  |  |  |  |  |  |  |
| 8/1 | .2 |  |  |  |  |  |  |  |
|  |  | 8/2 | 8/2 | 108,187 | 0 | 15,949 | 2,835 | 15.9 |
| 8/3 | .3 |  |  |  |  |  |  |  |
|  |  | 8/6 |  |  |  |  |  |  |
|  |  |  | 8/8 | 83,554 | 3,544 | 13,557 | 8,152 | 26.0 |
| 8/9-10 | 3.2 | 8/9 |  |  |  |  |  |  |
|  |  | 8/14 |  |  |  |  |  |  |
|  |  |  | 8/16 | 56,175 | 3,899 | 22,329 | 24,455 | 83.3 |
|  |  | 8/22 | 8/22 | 30,795 | 605 | 28,990 | 41,930 | 85.0 |
|  |  |  | 8/28 | 9,436 | 1,063 | 6,380 | 26,715 | 78.9 |

a/ Dust applications of Sevin at 0.75 lb./acre on June 14, 19, 22 and 1.13 lbs./acre on June 29, July 25, August 2, 6, 22 and BHC at 0.45 lb. plus DDT at 1.5 lbs./acre on July 5 and BHC at 0.6 lb. plus DDT at 2.0 lbs./acre on July 10, 14, 20, 28, August 9 and 14.

b/ Plants per acre, 26,582; lint cotton per acre, 558 pounds.

Table 7. Boll weevil records and numbers of squares in control field 15 [a]receiving one late treatment

| Date treated [b] | Date examined | Numbers per acre | | | | Larval infestation (Percent) |
|---|---|---|---|---|---|---|
| | | Squares | Weevils | Punctures | | |
| | | | | Egg | Feeding | |
| 7/26 | | | | | | |
| | 7/31 | 37,878 | 407 | 10,386 | 2,342 | 26.8 |
| | 8/7 | 19,550 | 504 | 6,313 | 1,222 | 35.4 |
| | 8/15 | 17,819 | 5,498 | 8,960 | 46,227 | 89.1 |
| | 8/21 | 10,589 | 1,222 | 7,433 | 23,928 | 87.5 |
| | 8/28 | 4,786 | 407 | 1,629 | 18,430 | 91.5 |

[a] Plants per acre, 20,364; lint cotton per acre, 223 pounds.
[b] Spray application of Guthion at 0.25 lb. plus DDT at 0.5 lb./acre.

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